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Platform economy in tax havens.
Do platform companies stand out in terms of tax arbitrage?

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Abstract

The last decade has seen a dizzying growth in the number and scope of digital platforms. The power and influence of the companies that control these platforms has generated a regulatory backlash that is currently underway. One of the areas in which regulation is beginning to take shape is taxation. In general, questions have been raised about the tax arbitration carried out by companies that control digital platforms, as well as about their ability to avoid paying taxes using various mechanisms. However, no study to date has been able to demonstrate whether, in aggregate, tax arbitrage is a common practice among platform companies. In this article we investigate the locational pattern of companies controlling digital platforms with respect to tax havens. Using Orbis database and natural language processing techniques, we identified over three thousand platform companies and using controlling groups (financial industries and TIC service industries), we observe the concentration of platform companies' headquarters in tax haven countries are as high as for the financial companies.

Key-words: digital platform; regulation; tax arbitrage; tax evasion; digital tax

Jel-code: G30; L86; O33

1.   Introduction

There has been an increasing interest in the literature on the "platform economy" (Kenney & Zysman, 2016; Srnicek, 2017; van Dijck et al., 2018) once digital platforms are "redefining the scope of market competition, the organization of industrial relations and work process, and influencing the power arrangements across the economy" (Bearson et al., 2021, p. 23). Digital platforms have consolidated themselves as a new organizational model (Gawer, 2021) whose importance and centrality in the process of value creation and appropriation is equivalent to the centrality of factories in the era prior to digitalization (Bearson et al., 2021; Kenney & Zysman, 2016). "Platforms are now redefining the scope of market competition, the organization of industrial relations and work process, and influencing the power arrangements across the economy" (Bearson et al., 2021, p. 23). Given the "new organizational form based on a relationship between the platform and the ecosystem of firms dependent on the platform and users who interact and transact through it" (Kenney & Zysman, 2020, p. 55), understanding the creation and capture of value across space has been challenging.

Recent literature advocates that digital platforms apply rent and value appropriation mechanisms (Sadowski, 2020a, 2020b; Srnicek, 2021) and that "the platform capitalism is based on the appropriation of value that is produced elsewhere in the global economy" (Srnicek, 2021, p. 39). While a growing body in the literature focuses on data extraction, digital enclosure and capital convergence as recurrent rentiership mechanisms (Birch et al., 2020; Christophers, 2020; Sadowski, 2020b; Zuboff, 2019); another highlights the fact that digital platforms are able to design international fiscal strategies to take advantage of fiscal competition worldwide, shifting profit from the high-tax to the low-tax jurisdictions (Bloch & Demange, 2021).

The first body proposes that the assetization of personal digital, that is, turning personal digital data into a private asset, is a practice restricted to digital platform companies. There are case studies demonstrating how digital platform companies combine intellectual monopolies with the centralization of data and secrecy (Rikap, 2022). However, one might argue that the strategy of shifting profits to low tax jurisdictions is not restricted to platform companies once it is a regular mechanism applied by ordinary enterprises (Jones & Temouri, 2016) in a financialized globalized world.

Although we find evidences showing platforms practice a movement to low-tax jurisdiction – Uber is an example (Wigan, 2021) – there is no study on a global scale considering the platform economy as a whole. Therefore, the objective of this paper is to bring new evidences to answer the following questions: are platform companies particularly more adept to offshore tax haven activity? Are they more likely to locate their headquarters in tax havens, even when compared with other companies?

To answer the previous questions, we structured the paper in five sections. The first section provides a brief debate on arbitrage and tax avoidance. On section two, we present the methodology, using data science and artificial intelligence tools, on how to identify platform firms based on the description of their products and services. As we depart from the premise that platforms are pervasive, therefore creating new markets and reorganizing traditional industrial sectors (Kenney et al., 2021), and reshaping the geography of value creation and extraction (Kenney & Zysman, 2020), we believe that making a broader discussion on platform economy which goes further beyond on the analyst of the tech giants alone such as "GAFAM"– acronyms used to refer to Google/Alphabet; Amazon; Facebook/Meta; Apple; and Microsoft – can provide a bigger picture of the platform economy. Still in section two we present the "controlling groups" to which platform firms are confronted to. We define three other sectors: a) financial

industry; b) ICT service industry (not considering the ones that were classified in the platform industry) and, c) non-platform firms (other companies not classified in the previous sectors). In section four, we present the first findings. Finally, in the last section we make some final comments and present possible avenues for investigation.

2. Digital platforms: value appropriation and tax avoidance mechanisms

2.1. Rent extraction and Global Wealth Chains

The operation of Platform Companies exacerbates a growing differentiation between the creation of value and the creation and protection of wealth in the Global Economy, which creates opportunities for legal arbitrage (Wigan, 2021). Hence, the understanding of the strategies that are enforced by the Platforms must go beyond the notion of Global Value Chain (GVC), analyzing them as inserted in a Global Wealth Chain (Seabrooke & Wigan, 2014, 2017).

Seabrooke and Wigan (2017) define Global Wealth Chains (GWC) as "the transacted forms of capital operating multi-jurisdictionally for the purposes of wealth creation and protection". The GWC appears to be more appropriate to address the challenges of the global economy in face of the growing importance of intangible capital and tax avoidance in corporate dynamics (Bryan et al., 2017).

An important dimension is how platforms engage with different nature of assets locally and transnationally. Different platforms' operation standards in distinct locations are produced from how they articulate legal affordances and relationships within global value chains and global wealth chains in order to maximize both their flexibility and capacity to avoid commitment and regulatory burdens and their control over assets in multiple scales (Grasten et al., 2021). According to Bryan et al. (2017), the intangible capital has a 'double life" in location and time: "for patent or legal protection purposes it can be said to exist in one location, but for tax or other regulatory purposes it (or at least the revenues streams it may represent) can exist elsewhere" (Bryan et al., 2017, p. 59). Thus, although value and wealth chains are integrated activities, platforms create an artificial view on the firm where production of value and creation and protection of wealth are legally distinct (Grasten et al., 2021).

At one hand, the value chains are used to extract value from local spaces, where some platforms exploit the use of people's assets that already exist, such as cars and homes, or assets that are easy to replace with minimal infrastructure, for example scooters and city bikers (Grasten et al., 2021). At the other hand, the GVC revolves around information service provision and financial management, where the ambiguity in the location of intangible capital creates opportunities to arbitrage (Bryan et al., 2017; Grasten et al., 2021). The digital nature of the services provided by the platforms are also important to split value and wealth dynamics.

> Digital products and services can be delivered at distance. Servers hosting markets, generating product or delivering services can be located strategically so the activity assumed to underlie value creation is located in low or no tax jurisdictions, while revenue that produces (mobile) profits arises in high tax jurisdictions. […] In the digital economy a clear demarcation between production and consumption collapses. Firms in the digital economy sell advertising on the basis of information garnered from user search history and search patterns. Content, for example details of everyday lives made available on platforms such as Facebook, Instagram or Snapchat, it uploaded by consumers. User participation in data production obscures the location of value creation, even while the network effects of user participation are capitalized in

burgeoning market valuations. (Wigan, 2021, pp. 197–198)

2.2. *Arbitrage and tax avoidance*

Companies are increasingly attracted to locate affiliates, subsidiaries or headquarters in tax haven countries due both to the low (or even zero) rates of taxation of corporative income and the secrecy that they ensure in terms of information exchange with revenue authorities in other countries. Thus, by exploiting loopholes and mismatches of regulatory and tributary pattern across countries, those firms seek opportunities to arbitrage and avoid taxation (Jones et al., 2018; Jones & Temouri, 2016). The heterogeneity among national tax systems emerges from differences in corporate tax rates and in the definition of residence for tax purposes, or in the identification of hybrid financial instruments as debts or equity (Seabrooke & Wigan, 2014).

 Companies' tax avoidance strategies involve contractual arrangements between their related parties, some of them located in low-tax jurisdictions. And, to shift out profits using tax haven, these firms can employ a diverse range of transactions that can be structured, for example, by intrafirm debt, royalty payments, dividend repatriations, intrafirm trade, and transfers of intangible property (Desai et al., 2006a).

Those arrangements, therefore, are built from the installation of a unit (for example, a subsidiary) of the company that operates in the tax haven, that will align their actions with the non-tax haven units. A very used tool to minimize tax liabilities consists in the manipulation of transfer prices associated with intrafirm transactions and trade. The firms can, for instance, reduce the prices charged by the affiliates in the high-tax countries for goods and services provided to related parties in the low-tax counterparts (Jones et al., 2018; Jones & Temouri, 2016).

Some assets, however, are location bound, which creates constraints to ownership transfer across international borders. Intangible assets – e.g., goodwill, patent rights, brand names, R&D facilities, trademarks and copyrights, software, licenses and sub-licenses, etc. – do not present such limitations. Hence, this class of assets can be easily transferred to tax haven in order to, thereby, receive payments from the intangible assets from the related companies located in higher-tax countries (Desai et al., 2006b; Jones et al., 2018; Jones & Temouri, 2016). In other words, "intangible assets are not only difficult to value, providing space for opportunistic valuations, they are easy to move" (Wigan, 2021, p. 198). Consequently, firms' R&D intensity is often described as an important determinant of its likelihood to tax haven activity, due to such easier capacity to relocate income from intangible technology assets and intangible property (Desai et al., 2006b; Dyreng et al., 2008). "While machinery can only be in one place at one time, intangible assets can in one jurisdiction for legal protection purposes, another to register revenue streams and another for tax purposes". (Wigan, 2021, p. 198). As a consequence of the "developments in platform-based services like Google, Facebook and Uber are pointing to new ways of managing and deploying intangible assets"(Bryan et al., 2017, p. 59).

Jones and Temouri (2016), for instance, illustrated a model of tax avoidance example in a simple structure with a parent company and two subsidiaries, one of them located in a tax haven.

> The parent firm sub-licenses its intellectual property to the tax haven subsidiary in a location with negligible level of corporate income tax. The tax haven subsidiary then sells the intellectual property to the subsidiary located in the non-tax haven location at a higher price, allowing the firm to avoid corporate tax in the location by declaring lower profits due to higher costs. (Jones & Temouri, 2016, p. 239).

A much more complex scheme of tax avoidance, involving multiple tax haven and non-tax haven subsidiaries, is known as the "Double Irish–Dutch Sandwich". In such sort of processes, the complexity and the secrecy of the tax-haven network established by the company increases substantially with the number of subsidiaries, which reduces its trackability by revenue authorities (Jones et al., 2018). This structure has been used by U.S. tech giants like Apple, Facebook, Google, Microsoft (Jones et al., 2018) and Uber and Airbnb (Grasten et al., 2021).

The complexity of tax avoidance schemes increases even more when the company has a strong digital presence: "the interaction of nationally differing criteria in testing corporate residency and the dematerialized nature of digital service delivery mean that, in economic terms, a firm may be active in a jurisdiction while for fiscal purposes it is nowhere to be seen" (Seabrooke & Wigan, 2014, p. 259). Therefore, the Internet makes possible to firms to operate in many places without a taxable presence there (OECD, 2013; Seabrooke & Wigan, 2014). This characteristic is particularly relevant in the platform economy (Bloch & Demange, 2021). As the physical presence, and the employment of its own personal and assets, are not necessary to platforms to operate in many countries, they are able to escape from many regulations (Bloch & Demange, 2021).

There are empirical evidences showing there is a mismatch between where revenues are booked and where users are located. For example, Tang and Bussink (2017, p. 03) showed that "large digital platforms interact online with their users all over Europe, while booking (almost) all their revenues in low-tax Member States such as Ireland or Luxembourg". Uber is an enriching case:

> Uber established a Dutch holding company, Uber International C.V. which took on ownership of many of the firm's international subsidiaries and shared ownership with the United States parent of the firm's intellectual property. The holding company has no employees and is headquartered in Bermuda. A second Dutch subsidiary, Uber B.V collects 100 per cent of the ride fare received by its drivers, sending 80 per cent back the drivers and retaining 20 per cent. An intellectual property licensing agreement between the B.V. and the C.V. means that 99 per cent of the revenue (minus costs) from drivers is passed onto the C.V. as royalty payments. Royalty payments are not taxable in Holland. For the United States Internal Revenue Service Uber C.V. is a Dutch business, even if it is a subsidiary of a US company. For the Dutch, Uber C.V. is a U.S. controlled company headquartered in Bermuda, where there is no corporation tax. For Uber an intellectual property cost sharing agreement is placed between Uber C.V in the Netherlands and Uber Technologies, Inc. in the US ensuring that any future profits will be shielded from US taxation via a double Dutch through which profits ultimately flow to no corporate tax Bermuda (Wigan, 2021, p. 205).

Platforms strategies to shift profits to tax havens do not depend on the transfer pricing (Bloch & Demange, 2021). They can operate, for example, exploiting network externalities that increases demand in low-tax countries and reduce demand in high-tax places. Another possibility is to manipulates the apportionment key to increase the tax base in the tax haven, reducing it elsewhere (Bloch & Demange, 2021).

Digital platforms manage to minimize their fiscal responsibilities across multiple jurisdictions where they provide their services. There are as well other tax implications once "existing fiscal systems struggle to capture the immense value derived from people's data and their free labor as information producers" and "data processing and monetization usually takes place in foreign-located servers" (Belli & Zingales, 2020, p. 01).

# 3.	Methodology

In this section we present the database (section 4.1), the tools to mine the data (section 4.2, 4.3), the method to identify what we call "platform company" (section 4.4), the concept of "financial industries" and "ICT service industries" (section 4.5). Note that the method presented here is based on a previous study (Silva Neto et al., 2022) and it is open to improvements.

## 3.1.	Orbis database

To collect the information of products or services provided by companies, we used the largest and most complete commercial database available regarding economic-financial data, products, and ownership structure of companies. Orbis database currently covers around 425 million companies and entities worldwide. Orbis' geographical coverage is as follows: 30% of companies and entities are located in Europe; 27% in Asia; 17% in North America; 14% in Latin America and the Caribbean; 8% in Oceania; and, 5% in Middle East and Africa (BVD, 2020). Despite covering both privately and publicly traded companies, the minority of them (about 40 million) is held under private ownership.

For each company and entity, Orbis provides identification data (such as name, address, e-mail, URL, and a brief history); productive activity or line of action (economic activities classification, description of business and products and services); economic-financial indicators (balance sheet containing 26 items, profit and loss accounting containing 26 items and other financial indices containing 33 indices); company ownership structure featuring its parent companies and subsidiaries; among other information. Bureau van Dijk collects all the previous information from more than 160 suppliers and performs a standardization task reconciling the different accounting formats, currency, fiscal period allowing us to compare different companies from different countries directly (BVD, 2020).

The information on the products and services provided by Orbis, jointly with natural language processing (NLP), allows the identification of platform companies (understood hereafter as the categories proposed by Bearson, Kenney, and Zysman (2021), i.e., "platform firm" and "platform-dependent business") and then the possibility to elaborate maps with their precise locations. Thus, we process Orbis' fields that present companies' history and their products and services descriptions. As both fields contain unstructured texts, we resort to NLP to extract the meaningful information for our analysis: the products and services provided by companies. It is important to make a caveat, although Bureau van Dijk standardizes information, we have no control over its quality.

## 3.2.	Natural language processing (NLP)

NLP is a field of Artificial Intelligence (AI) that makes it possible to extract information from unstructured texts that do not present metadata and cannot be easily mapped into predefined fields of a database. NLP combines the power of linguistics and computer science to analyze the rules and structure of language and creates applications capable of understanding, analyzing, and extracting meaning from texts as we write routinely. Therefore, NLP is used to understand the structure and meaning of the human language, analyzing different aspects such as syntax, semantics, and morphology, transforming this linguistic knowledge into algorithms that extract structured information

from unstructured texts (Indurkhya & Damerau, 2010).

NLP algorithms create a vector representation of the words, thus transforming a text into something a machine can handle through mathematical operations. With this vector representation, AI algorithms are trained by associating the input text (now a set of vectors) and the characteristics we want to extract. In this step, NLP uses supervised AI algorithms that require a training base to identify the association patterns of the input and output variables of the algorithm's problem. We use a large set of texts, called corpus, freely written by their authors as a training base. In general, the corpus contains a large volume of literary works, Wikipedia pages, news transmitted through Google News, among others, all in the language that will be analyzed. As part of the NLP process related to this paper, we can mention:

- Tokenization breaks a sequence of words into smaller semantical units called tokens. Phrase tokenization divides the continuous text into different phrases identifying the beginning and end of each, while word tokenization divides a phrase into the different words that compose it. Word tokens are usually separated by whitespace and sentence tokens by punctuation symbols. However, there are also more complex structures, such words that usually come together as collocations and phrasal verbs. To illustrate the tokenization of words, see how the following sentence is tokenized: Customer service could not be better! = "Customer service", "could", "not", "be", "better".
- Marking part of speech (PoS) involves adding a category to identify the grammatical class to each token within the text. PoS markup is essential for identifying the relationships between words and understanding the meaning of sentences. Common PoS tags are verb, adjective, noun, pronoun, conjunction, preposition, and intersection. In this case, the words of the example above will be associated with the following tags: "Customer service": NOUN, "no": ADVER, "could": VERB, "be": VERB, "better": ADJECTIVE, "! ": PUNCTUATION.
- Dependency analysis: Dependency grammar refers to the way words in a sentence are connected. Therefore, an algorithm identifies how the "headwords" are related and modified by other words to understand a sentence's syntactic structure. The dependency analysis marker identifies grammatical structures such as subject, verb, direct and indirect object, and predicate.

To perform the tokenization, PoS, and dependency analysis steps, we use the Python spaCy[1] library trained from a corpus built collaboratively between BBN Technologies, University of Colorado, University of Pennsylvania, University of Southern California, Emory University, Princeton University. It includes several text genres such as news, telephone conversations, weblogs, internet news, and talk shows, thus capturing different uses of words and contexts.

The AI algorithm implemented in spaCy is trained using this corpus, thus creating a statistical model of association of each word with its markup: a tokenization separator character, a grammatical class, a dependency relation.

It is noteworthy mentioning that when we train the algorithm, we not only want it to memorize the records contained in the training base (corpus) but also to identify a pattern of association between these records and the characteristics we want to identify

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[1] https://spacy.io/

and generalize this pattern to other records. That is what makes AI algorithms predictable.

3.3.   *Identifying the different products and services of the companies*

Information about the products and services of the companies contained in Orbis is available either in the "Description and history" or "Product and services" description fields (Table 5, Annex). Those fields are unstructured text and may contain other information besides the description of products and services (see for an example). Thus, it is necessary to use NLP tools to identify the sentences in which products and services are described and get these products.

Even though Orbis "capture[s], treat[s] and standardize[s] data from a wide range of sources to provide (…) value-added company information" (BVD, 2020, p. 03) about public and private firms (including bank and insurance companies) from all countries, there are lacking information in the database. To give an idea of Orbis's complexity, richness, and limitations, we present Table 5, containing a sample of an identified firm: MercadoLibre. The company has its headquarters in Buenos Aires and is the leading Latin American platform whose biggest market in the region is Brazil, and it represents 55% of the firm's total income (Altimari, 2021). Note, however, that Orbis shows three results for MercadoLibre: one firm located in Argentina, one in Colombia, and another in the U.S. There is much more information available for the U.S. affiliated firm, while for the Colombian counterpart, there are just a few details.

After the previous caveat, the first step is identifying the words marked as a verb by the PoS. We identified the verbs following the procedure described above using a sample of 150,000 companies collected on Orbis. We chose to locate the verbs because this would be the easiest way to identify the action related to each sentence to identify later the one associated with production. Then, among all verbs identified, we picked up those associated with phrases that effectively describe the products and services of the companies and, considering those with occurrence greater than 100 (relative frequency above 0.1%), we obtain the following list of verbs associated with the products and services: engaged, providing, including, provides, include, provide, engage, offers, includes, sell, produced, manufacturing, rent, develop, make, sells, producing, selling, offering, specializing, developing, distributes, produces, deliver, manufactures, produce, design, processing, fabricated, focuses, engages, forging, making.

After identifying the verbs associated with the products and services, in the second step, we selected only phrases that present such verbs in the history, product, or trade description fields and, using the spaCy dependency analysis markup, we identified the direct or indirect objects associated with them. Therefore, those objects are the products and services the analyzed companies provide. Figure *1* illustrates the dependency analysis and shows how such marking allows the identification of direct and indirect objects.

3.4.   *Applying the NLP to support the identification of platform companies*

Our first step is to depart from twenty digital multisided platform companies[2] listed in Fortune's Digital 100 identified by Acs *et al*. (2021) and retrieve their product/service description texts on Orbis, using the fields: "Description and history", "Product and services", and "Trade description" as shown in Table 5. Then, we applied the NLP described in the previous section to identify products and services provided by

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[2]   They are Activision Blizzard, Alibaba; Alphabet; Amazon; Apple; Baidu; Booking Holdings; eBay; Facebook; Fidelity National Information; Fiserv; JD.com; Microsoft; Naspers; NetEase; Nintendo; PayPal; Rakuten; Recruit Holdings; and Tencent.

those digital multisided platform companies, which allowed us to create a first list with the 37 most often terms (Table 5, column 1, Annex). The result showed over 16 thousand firms.

We gathered the terms related to platforms from that first list (Table 6, Annex), and while adding up other 12 terms known to be related to this area, we excluded other 20 once they resulted in many "false negative" firms (Table 6, column 2). We then implement another search on Orbis, looking up the terms of this second list in the fields that may presented information regarding products and services. Thus, we got a broader set of firms whose information we also retrieved and analyzed using NLP as in the previous step. We updated our second list, including the other seven terms related to platforms, and excluding three terms from the second list and our final list had 33 terms (Table 6, final column) which allowed us to identify 3,147 platform companies.

Finally, we conducted a robustness test. We randomly selected 10% of the 3,147 companies and, independently, two of the authors evaluated them one by one and classified them as either "yes" or "no" as a platform company. The criterion was the use of network effects in a digital environment to label them as "yes". There was a code variation of 14% between the coders. In a new round, both aligned the concepts together to reach a final classification: 102 companies did not fit the criteria. Considering the random sample, this results in a confidence percentage of 66% in the developed algorithm. It should be noted that the classification criterion was conservative to avoid false positives (e.g., 55 Chinese companies with insufficient data for judgment were considered as "non-platform companies"[3]).

3.5. Identifying other companies' industries

In order to verify if platform companies' strategies to evade taxes, moving their headquarters to tax haven countries, we compare them with other enterprises types (our controlling group). Three groups of companies seem to be particularly relevant in our analysis.

To construct all the groups, we went through the list of 3,147 digital platform companies that we identified, and for each company, we randomly picked up another one, looking up in the whole Orbis company list. The other company selection follows two criteria. The first one is related to its revenue which is in the range of correspondent platform-company revenue plus or minus 10%. The second criterion is associated with the company industrial sector. By specifying this criterion, we construct three groups as follows:

- "Non-platform group": the NACE of the randomly picked company is the same as the "digital platform company group", however, we exclude related platform companies from the selection list;
- "Financial industry group": the randomly picked company NACE is from financial service activities (NACE 64), insurance and pension funding (NACE 65) or activities auxiliary to financial services and insurance activities (NACE 66) (Table 1);
- "ICT service industry group": the randomly picked company NACE is one of those presented in Table 2. We chose this set of NACE following the Guide

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[3] The only information available for all these companies were "Specialized in operating web sites that use a search engine to generate and maintain extensive databases of Internet addresses and content in an easily searchable format."

to Measuring the Information Society by OECD (2011), which defines the service industry as the one that provides products that intend "to enable ICT function of information processing and communication by electronics means" (OECD, 2011, p. 152). The companies belonging to this industry range, for instance, from those engaged primarily in the dissemination of software licenses to customers for the right to execute software on their own computers and other devices (i.e., NACE 582) to those primarily committed to website services that act as Internet portals, search pages, etc. (i.e., NACE 6312) (Table 2).

Table 1 – Financial industries. NACE Rev. 2

NACE	Description
64	Financial service activities, except insurance and pension funding
65	Insurance, reinsurance and pension funding, except compulsory social security
66	Activities auxiliary to financial services and insurance activities

Source. Authors' own. Data source from EUROSTAT (2008, p. 79).

Table 2 – ICT service industries. NACE Rev. 2

NACE	Description
582	Software publishing
6110	Wired telecommunications activities
6120	Wireless telecommunications activities
6130	Satellite telecommunications activities
6190	Other telecommunications activities
6201	Computer programming activities
6202	Computer consultancy activities
6203	Computer facilities management activities
6209	Other information technology and computer service activities
6311	Data processing, hosting and related activities
6312	Web portals
9511	Repair of computers and peripheral equipment
9512	Repair of communication equipment

Source. Authors' own. Data source from OECD (2011, p. 159).

4. Results and discussion

4.1. First description of the platform companies

The digital platform companies we identified are concentrated in a few industrial sectors, it is possible to observe Table 3. Although only one sector concentrates more than 50% of platform companies – "information and communication" (NACE "J") –, we can identify platform companies in all sectors but two: "activities of households as employers" (NACE "T") and "activities of extraterritorial organizations and bodies" (NACE "U"). It is also noticeable that "professional, scientific and technical activities" (NACE "M") and "manufacturing" (NACE "C") concentrate each about 9% of total firms.

Table 3 – Platform companies according to NACE Rev.2 sections

Section	Description	N.	%
A	Agriculture, forestry and fishing	6	0.20%
B	Mining and quarrying	10	0.30%
C	Manufacturing	271	9.30%
D	Electricity, gas, steam and air conditioning supply	5	0.20%
E	Water supply; sewerage, waste management and remediation activities	1	0.00%
F	Construction	17	0.60%
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	250	8.60%
H	Transportation and storage	28	1.00%
I	Accommodation and food service activities	18	0.60%
J	Information and communication	1,589	54.70%
K	Financial and insurance activities	170	5.80%
L	Real estate activities	18	0.60%
M	Professional, scientific and technical activities	283	9.70%
N	Administrative and support service activities	112	3.90%
O	Public administration and defense; compulsory social security	4	0.10%
P	Education	17	0.60%
Q	Human health and social work activities	12	0.40%
R	Arts, entertainment and recreation	76	2.60%
S	Other service activities	19	0.70%

Source: Authors' own. Data sourced from Orbis. Note: NACE was available for 92% of our database.

The 3,147 platform companies identified corroborate that both the U.S. and China are the two main poles of the global platform economy, concentrating 27.2% and 32.8% of the world's platform companies (Table 4). Despite that, other countries also host platform companies: the Great Britain, Japan, South Korea, Australia and Canada. To a much lesser extent, the presence of the platform company model is also present across other European countries such as Sweden, France, the Netherlands, Italy, and Denmark.

There are geographic voids, mainly in the Global South[4]. Notwithstanding that, there are in those areas relatively more economic dynamic centers such as, Thailand, Brazil, Iran, and Kenya where we observe the (timid) presence of platform companies. India is a counter example for the Global South.

Countries commonly known as "tax havens"[5] concentrate 10.2% of the world's platform companies. The Cayman Islands, for instance, ranks in the third position, only after China and the U.S. For example, PagSeguro – a Brazilian fintech platform company engaged in the operation and management of a mobile payment-based e-commerce service for commercial operations – was established in São Paulo in 2006 and was the fastest-growing company in the sector in the country (Sachs, 2018). Although its development office (PagSeguro Internet S.A.) is still located in Brazil, its headquarters (PagSeguro Digital Ltd) has been in Georgetown (Cayman Islands) since 2018.

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[4] Although we cannot point out the reason for the geographic gaps, some possible explanations that can be investigated are: Orbis indexes only larger companies or public companies, which favors finding a greater concentration in countries where the platformization originated. In other words, the database would not be adequate to capture startups and smaller companies that, as we know, started a catch-up movement in the countries of the Global South. Another possible explanation is the lack of telecommunications infrastructure in the Global South, which presents a considerable risk for digital multinationals (Nambisan, Luo, 2022).

[5] Corporate tax havens considered the classification on Oxfam International: Bermuda, Cayman Island, the Netherlands, Switzerland, Singapore, Ireland, Luxembourg, Curacao, Hong Kong, Cyprus, Bahamas, Jersey, Barbados, Mauritius, and, British Virgin Islands.

Table 4 – Platform companies by selected countries

Countries	N.	%
China	1,031	32.8
United States of America	855	27.2
"Tax haven" countries	320	10.2
Cayman Islands	165	5.2
Singapore	57	1.8
Netherlands	20	0.6
Hong Kong	18	0.6
Bermuda	17	0.5
Ireland	16	0.5
Other Tax haven" countries	27	0.9
Great Britain	124	3.9
Japan	117	3.7
South Korea	84	2.7
Australia	73	2.3
Taiwan	65	2.1
India	62	2.0
Canada	59	1.9
Other countries	357	11.3
Total	3,147	100.0

Source: Authors' own. Data sourced from Orbis.

4.2. Platform companies' presence in tax havens

In order to verify if platform companies' strategies to evade taxes, moving their headquarters to tax haven countries, is a particularity of those companies, we compare them with other enterprises types (our controlling groups). Three groups of companies seem to be particularly relevant in our analysis: a) financial industries; b) ICT service industries; and c) all industries.

In Figure 1 we summarize the differences in the use of tax arbitrage between different groups of companies. Non-digital platform companies, the first group depicted, present 6% of their companies based in tax havens. The group of companies belonging to the ICT service sectors presents 8% of the sample based in tax havens. Our interest group, digital platforms, registers 12% of their companies based in tax havens, a fraction very close to the group of financial industries, with 13%.

The percentages of both digital platform companies and other ICT service firms based in tax havens corroborate our previous discussion on how intangible assets and R&D intensity enables firms to exploit tax avoidance through profit shifting. Indeed, "technology firms have been at the forefront on the use of transnational corporate structure for wealth management purposes, arbitraging between jurisdictions offering different legal affordances" (Grasten et al., 2021, p. 04).

Our result indicates that among all classes we analyzed, the financial industry is the most prone to tax-haven activities. This is not unexpected, given that "the political and economic history of offshore jurisdictions is integrally bound up with developments in finance" (Bryan et al., 2017, p. 62). Therefore, the previous establishment of a whole structure of offshore financial centers in these countries seems to be a necessary condition to the multijurisdictional operation of a broader set of companies.

However, the similarity in the percentage of the financial and platform groups draws attention. This proximity seems to corroborate the issues raised regarding tax arbitration being a widespread practice among companies in this category. At the same time, the percentage shows that this is still far from covering all companies in this group.
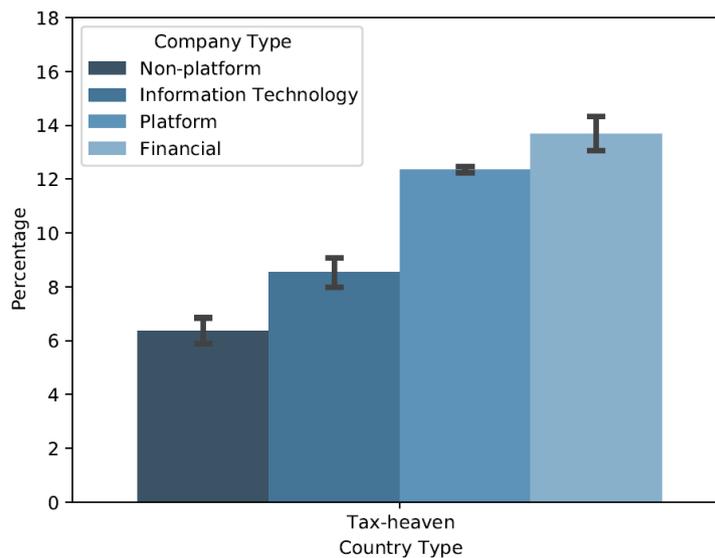
Figure 1 – Percentage of companies based in tax havens, per company type

Source: Authors' own. Data sourced from Orbis.

The proximity between the group of financial companies and platform companies also indicates that digital platforms, in fact, take advantage of previous trends in relation to the socio-economic order (Srnicek, 2017) and in this aspect they seem to be more of a continuity of a regime of accumulation than a radical transformation (Montalban et al., 2019). It should be noted, however, that tax arbitration is just one mechanism among many others for handling the tax issue.

The current context is marked by the rapid growth in the use of these offshore financial centers to shift out assets and profits by non-financial firms, mainly those with significant intangible assets, which is the case of digital platforms (Bryan et al., 2017). In this sense, their relative importance in the global economic network is closely related to sectoral knowledge-intensive activities: "financial transactions are offshored when intellectual property is high and physical capital is low" (Sigler et al., 2020, p. 631).

5. Conclusions

The paper's objective was to test whether digital platform companies employ arbitrage and tax avoidance mechanisms by moving to low-tax jurisdiction. To do so, we used a methodology developed by Silva Neto et al. (2022) and replicated in section 3 to identify what we called digital platform companies. We were able, by using NLP techniques, to gather over three thousand platform companies.

In summary, we observed that digital platform companies are concentrated in China and in the U.S. with a substantial presence in the Great Britain, Japan and South Korea. While there are evidences showing there are platform companies in some dynamic countries in the Global South such as India, a great deal of them is located in tax haven countries as the Cayman Islands, Singapore, the Netherlands, Hong Kong, Bermuda and Ireland. The dynamics of the platform ecosystem is very complex, so it is its value creation and extraction. "The digital economy is undermining the geographical conceptions of economic activity that inform tax regulation (…) [and] is also subverting the rationale underlying conceptions of value production that inform taxing rights" (Wigan, 2021, p. 197).

With our database we showed there are nonnegligible differences in the use of tax

arbitrage between distinct groups of companies. We found 13% of financial industries based in tax haven followed by digital platform companies with 12%. The relative high percentage of digital platforms in tax haven highlights the importance of debates over where and how value is created in the digital economy as it has political and economic implications.

In terms of limitations of the article, it is important to emphasize the nature of the database from which the samples are extracted. Orbis aggregates data from publicly traded companies or large companies, leaving out of the analysis small companies or startups that are involved with platformization. Therefore, a potential part of the erosion of the tax base is out of the sample. Furthermore, digital platforms are an organizational model, not a sectoral class. This means that there is a wide variety of companies within the set of "platform companies". In this article we did not distinguish between these companies, their sizes or business models, which may be more or less geographically tethered.

In terms of possible lines of research that unfold from this article, we can mention the investigation of the effects of regulation and the measurement of the fiscal damage that global platforms cause on the Global South. In the first line, it would be interesting to observe what would be the effects on the group here called "platform companies" of the tax legislation being defined within the scope of the OECD (2020). There is an ongoing harmonization of taxation models for gig economy and sharing economy platforms, with possible not only tax effects, but that reflect a readjustment of the distribution of power between platform companies and the state.

Another possible line of investigation could focus on how relevant innovation platforms (Gawer, 2009) from the Global North (and China) operate in the Global South and how many of them are becoming infrastructures (Plantin et al., 2018) and are creating hierarchies and interdependent structures of power (van Dijck, 2020). We have observed that there are platform-dependent businesses originally from the Global South that have accessed and combined the modules of those innovation platforms and migrated to tax havens as the Brazilian fintech platform company called PagSeguro. More investigations on this are necessary and could bring new insights to understanding the platformization in the Global South and providing empirical evidences for guiding new regulations.

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Annex

Table 5 – Example of Orbis information available on products/services and history of companies listed in the database

Company name	MercadoLibre Inc.	MercadoLibre Colombia Ltda	MercadoLibre SRL
ID number	US980212790	CO170001515680	AR30-70308853-4
Country code	US	CO	AR
City	-	Bogota	Buenos Aires
NACE (*)	7490	6209	-
Trade description	MercadoLibre, Inc. is an e-commerce company. The Company enables commerce through its _marketplace platform_ in Latin America, designed to provide users with a portfolio of services to facilitate commercial transactions. Its geographic segments are Brazil, Argentina, Mexico, Venezuela, and Other Countries (…).	Technology and computer service activities	Operates an online trading platform in Latin America
Products and services	Classifieds service that enables users to list their offerings related to motor vehicles, vessels, aircraft, real estate, and services outside the _marketplace platform_; and MercadoPago, an integrated online payments solution to facilitate transactions on and off the MercadoLibre Marketplace by providing a mechanism that allows its users to send and receive payments online (…).	Offers a marketplace, an online trading service that permits businesses and individuals to list items and conduct sales and purchases online in a fixed-price or auction-based format; and MercadoPago online payments solution, an integrated online payments solution	Latin America
Description and history	MercadoLibre, Inc., incorporated on October 15, 1999, is an e-commerce company. The Company enables commerce through its _marketplace platform_ (…) in Latin America. The Company's platform is designed to provide users with a portfolio of services to facilitate commercial transactions (…). The Company offers its users an ecosystem of six integrated e-commerce services: the MercadoLibre Marketplace, the MercadoLibre Classifieds Service, the MercadoPago payments solution, the MercadoLibre advertising program, the MercadoShops online Webstores solution, and the MercadoEnvios shipping service. (…) The Company competes with Rakuten, Amazon, B2W Inc., Cnova, Aliexpress, Netshoes, Dafiti, Casas Bahia, Walmart, (…), Facebook, Google, Amazon, Microsoft, Yahoo!, Paypal, DineroMail, Bcash, PagSeguro, Western Union, PayU, MOIP, Alamaula.com, OLX.com, and QueBarato.	-	MercadoLibre SRL

Source: Authors' own. Data sourced from Orbis, Bureau van Dijk. Note: (*) NACE stands for _Nomenclature statistique des activités économiques dans la Communauté européenne_

Table 6 – Lists of terms retrieved in the query related to digital platform

| 1st List	2nd List	Final List
application programming interface		
cloud computing		
cloud-based solution		
	cloud service	
data-centric cloud		
digital banking		
digital content		
	digital marketplace	digital marketplace
digital payment	*digital payment*	*digital payment*
	digital platform	digital platform
ecommerce		
e-commerce		
electronic media		
electronic payment		
e-media		
e-payment	*e-payment*	*e-payment*
fintech service		
	innovation platform	innovation platform
	internet marketplace	internet marketplace
	internet platform	internet platform
intelligent cloud		
internet search solution	*internet search solution*	*internet search solution*
internet shopping	*internet shopping*	*internet shopping*
marketplace platform	*marketplace platform*	*marketplace platform*
mobile devices		
mobile game	*mobile game*	*mobile game*
mobile payment	*mobile payment*	*mobile payment*
mobile platform	*mobile platform*	*mobile platform*
network service		
mobile service		
online advertising service	*online advertising service*	*online advertising service*
online booking	*online booking*	*online booking*
online game	*online game*	*online game*
online gaming	*online gaming*	*online gaming*
	online marketplace	online marketplace
	online platform	online platform
online reservation	*online reservation*	*online reservation*
online retailer		
		online social media
	online trading platform	
payment platform	*payment platform*	*payment platform*
payment service		
search engine	*search engine*	*search engine*
serverless computing	*serverless computing*	*serverless computing*
web application		
	social game	
		social media
		social media content
		social media management
		social media marketing
		social media strategy
social network	*social network*	*social network*
		social networking services
	software platform	software platform
	transaction platform	transaction platform
web portal		
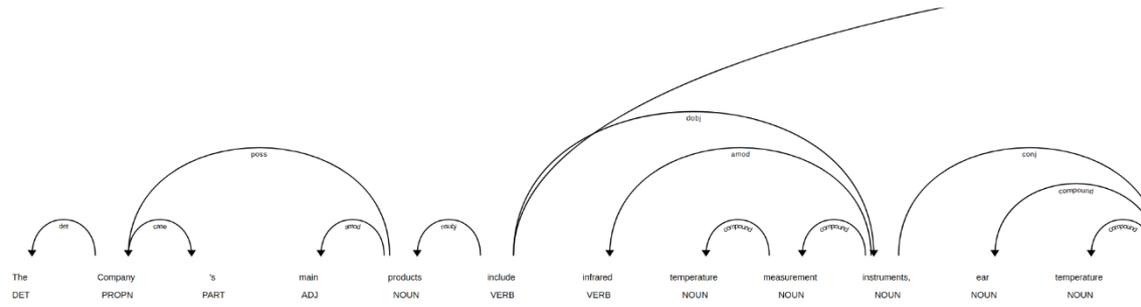
Source: Authors' own.

Figure 1 – Example of dependency analysis markup

Source: Authors' own.